



PRR-2600 Profiling Reflectance Radiometer

BSI's original PRR-600 was designed to meet the need for a hand-lowered profiling radiometer, capable of measuring downwelling and upwelling light in seven wavelengths. Building on this successful design, the new PRR-2600 offers researchers a number of significant improvements. The radiometer is now features eight wavelengths per array and combines a high-speed data acquisition system with high-resolution electronics, within the same compact package.

The PRR-2600 is battery powered and measures eight channels of downwelling irradiance and upwelling radiance. Water temperature and pressure/depth are also measured. This proven design provides a low-cost ground truth or aquatic research system that is lightweight, compact and easily deployed.

The PRR-2600 is available in a variety of special configurations, including a split design for use in turbid waters (PRR-2600S), a mooring design, a free-fall descent system, and a low-profile design for towed applications. The instrument is also available in an irradiance-only configuration (PER-2700).

The basic PRR-2600 profiling system includes an underwater radiometer, battery-powered deckbox, Windows®-based operating and data-acquisition software, AC adapter/charger, and RS-232 cable. Custom-length waterproof cable (PSC-805) and stainless-steel lowering-frame must be ordered separately. Other PRR-2600 options include a free-fall deployment system, dual-axis instrument clinometers and a 0-40 m high-resolution depth channel for use in shallow water research.



Key Features

- Measures eight channels each of downwelling irradiance and upwelling radiance
- Nearly 30 specialized, highly accurate, low-noise detector channels are available
- High-speed sampling of downwelling and upwelling signals minimizes aliases in calculated references
- The PRR-2600 has a compact design and battery power, making the system easily transportable
- Underwater (PRR-2600) and surface (PRR-2610) instruments can be radiometrically matched
- Temperature and depth/pressure transducers operate to 300 m
- Fully integrated and microprocessor-controlled
- Windows®-based, PROFILER operating and data-acquisition software is included

**Specifications subject to change without notice*



PRR-2610 Reference Radiometer

PRR-2610 Reference Radiometer

If both profiling and surface measurements are required, PRR-2600 systems can be ordered with a radiometrically matching PRR-2610 Reference Radiometer, cosine-corrected for surface irradiance. With the PRR-2600 and 2610 operating in unison, underwater and surface measurements may be compared to monitor possible interference from shadows cast by boats or clouds and to assist in the development of atmospheric corrections.

Optical Characteristics

The PRR-2600 optical arrays can be assembled in any configuration of eight channels, selected from a list available wavelengths (consult factory). The PRR-2600 cosine irradiance collector is formed from Teflon®, backed with a quartz support and is optimized for excellent cosine response in water. Similarly, the PRR-2610 surface reference collector is optimized for use in air. Filter photodetectors in the PRR-2600 and PRR-2610 are specified to 10 nm FWHM ± 1 nm. Both the irradiance and radiance detector geometries have been designed to limit the solid angle to 10° and the filter design has been specified to compensate for this solid angle in arriving at the center wave-

Sensor Interface

The signals from all sensors are digitized and available as RS-232 and RS-485 output. Data are presented as 12-bit mantissa plus 2-bit exponent plus sign. Software is provided for decoding the binary data to ASCII files. RS-232 requirements are 9600 baud, 8 data bits, 1 stop bit, no parity, no hand-shaking.

Calibration

Optical calibrations are performed in accordance with the methods outlined by the National Institute of Standards and Technology (NIST), National Bureau of Standards (U.S.) Technical Note 594-13 and NBS Special Publication 250-20. For radiance calibrations, we employ a Spectralon® (Labsphere) plaque functioning as a near-perfect “Lambertian” diffuser with a NIST-traceable working Standard Of Spectral Irradiance. The protocol has no formal NIST reference, but was systematically reviewed in the context of the NASA-sponsored SeaWiFS Round Robin Intercomparison Experiment (SIRREX).

Deckbox

The PRR-2600 radiometer is equipped with a compact waterproof deckbox that provides RS-232 and RS-485 computer interface and battery power for the radiometers. Deckbox components include a 12Volt / 6 AH rechargeable gel-cell battery with an LED indicator for low battery voltage. A Universal (85-264 VoltsAC, 47-63 Hz) adapter/charger is also included. One, 2-meter RS-232 cable is provided with the PRR-2600 deckbox.

Cables

Power and data communications with underwater and surface instruments are via cable (PSC-805). This custom-manufactured cable, has 6-conductors with dual-shielding and multiple Kevlar® strength members. This cable is rated at 450kg and intended to support total weight of the instrument package. PSC-805 cable is available in custom lengths up 300m .

**Specifications subject to change without notice*



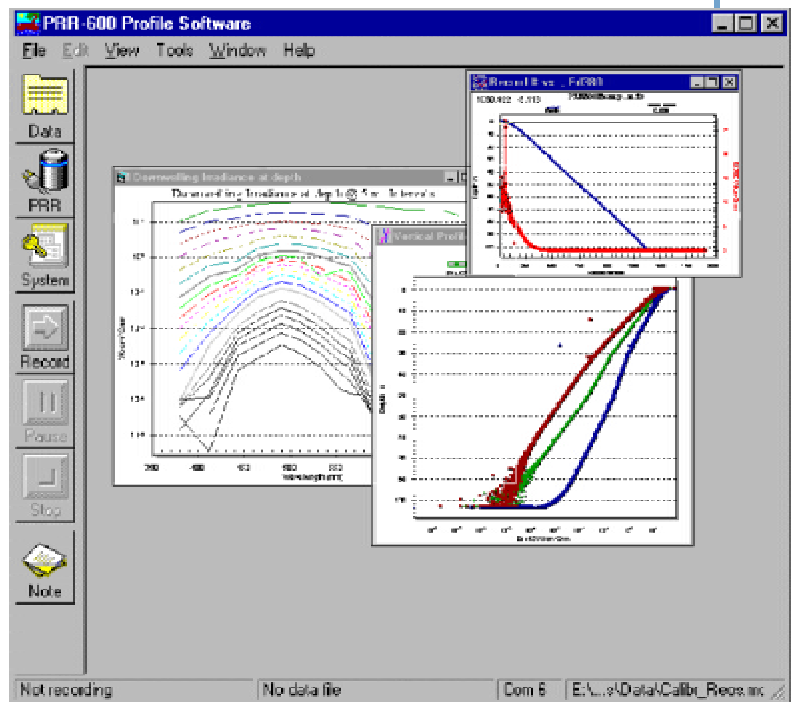
PRR-2600 In "Free-Fall" configuration



Deployment of PRR-2600 in optional "Split" configuration

Software

The PRR-2600 utilizes our new Windows-based, PROFILER® operating and data-acquisition software. Profiler is fully compatible with Windows 95, 98, 2000 or NT, allowing the host PC to acquire and display data in real time. This custom software offers full-color graphical display with multiple, user-selected channels and allows a high degree of interaction and customization. This software includes user-specified configurations to speed, profile setup. When profiling, the user can view three plots (Time, Profile, and Spectral Plots), as well as a live-channel display and a large, easy-to-read instrument depth, inclination, and record number display. The software allows the user to annotate plots, such as to mark the beginning or end of an upcast or downcast or to define dark segments, facilitating dark corrections.



Sample of "PRR-2600 Profiler" Software Display

**Specifications subject to change without notice*

Specifications

PRR-2600 Physical

Diameter: 10 cm
Length: 40 cm
Depth Range: 200 m
Housing Material: PET plastic
Weight: 5.4 kg in air
Temperature Rating: -5°C to 35°C

Optical Features

Spectral Range: 340-900 nm
Standard Wavelengths (SeaWiFS): 412, 443, 490, 510, 555, 625, 665nm, and PAR (Photosynthetically Active Radiation—400-700 nm)

Optional Wavelengths: 340, 380, 395, 455, 465, 475, 520, 532, 565, 589, 670, 683, 694, 710, 765, 780, and 875 nm
Bandwidth: 10 nm FWHM standard; 20 nm FWHM optional

Sensors

Standard: 8 channels of Upwelling radiance; 8 channels of downwelling cosine irradiance; detector array temperature; PRT water temperature; pressure/depth

Optional Sensors: Dual-axis instrument inclinometer, dark diodes, transmissometer or fluorometer, and auxiliary analog channels.

Irradiance Array

Filter Photodetectors: 8 wavelengths standard
Filter Type: Custom low-fluorescence interference.

Cosine Collector: Teflon®-covered quartz.

Collector Area: 3.81 mm²

Out-of-band Rejection: 1x10⁻⁶

Angular Response: ±2% from 0° to 65°; ±10% from 65° to 85°

Typical Saturation: 300 μWcm⁻²nm⁻¹

Noise Equivalent Irradiance: 3x10⁻⁹ Wcm⁻²nm⁻¹

System Time Constant: 0.1 seconds

Typical Eight-Channel Configuration

<u>Channel</u>	<u>PRR-2600Ed</u>	<u>PRR-2600Lu</u>	<u>PRR-2610Es</u>
1	412nm	412nm	412nm
2	443nm	443nm	443nm
3	490nm	490nm	490nm
4	510nm	510nm	510nm
5	555nm	555nm	555nm
6	625nm	625nm	625nm
7	665nm	665nm	665nm
8	EdPAR	683nm	EsPAR

Radiance Array

Filter Photodetectors: 8 wavelengths standard

Detectors: Custom 13mm² silicon photodiodes

Filter Type: Custom low-fluorescence interference

Field of View: 10° half angle in water (SeaWiFS-compatible)

Entrance Aperture: 5.05 mm diameter

Out-of-band Rejection: 1x10⁻⁶

Typical Saturation: 5 μWcm⁻²nm⁻¹sr⁻¹

Noise Equivalent Radiance: 5x10⁻¹¹ Wcm⁻²nm⁻¹sr⁻¹

System Time Constant: 0.1 seconds

System Electronics

System Data Rate: >15 Hz (varies with number of wavelengths)

Interchannel Sampling Delay: 300 msec ±175 nsec

Data Acquisition

Data Acquisition Subsystems:

16 channels per head with PGA and 12-bit A/D combination to yield ±10 VFS and 4.8 mV LSB.

Output: RS-232 and RS-485 full duplex at 9600 baud. Single COM port for both instruments (PRR-2600 and PRR-2610).

Deckbox

Battery Power: Rechargeable 12-V gel cell battery. LED indicator light for low battery voltage.

AC Adapter/Charger: Universal 90-240 VAC, 50-60 Hz

Cable

RS-232 serial interface; Underwater cable (PSC-805) shielded with Kevlar® strands, rated at 450kg. Custom lengths are available, to 300 meters.

PRR-2610 Surface Sensor

Diameter: 10 cm

Length: 36 cm

Materials: Aluminum housing

Weight: 4kg in air

Temperature Rating: -5°C to 35°C

Channels: 8 wavelengths standard

PRR-2610 Optical Features

Spectral Range: 340-900 nm

Standard Wavelengths

(SeaWiFS): 412, 443, 490, 510, 555, 625, 665nm, and PAR (Photosynthetically Active Radiation—400-700 nm)

Optional Wavelengths: 340, 380, 395, 455, 465, 475, 520, 532, 565, 589, 670, 683, 694, 710, 765, 780, and 875 nm

Bandwidth: 10 nm FWHM standard; 20 nm FWHM optional

Standard Sensors: Downwelling irradiance and detector array temperature

Optional Sensors: Dual-axis instrument inclinometer



Biospherical Instruments Inc.

5340 Riley Street, San Diego, CA
92110-2621 USA

Phone: (619) 686-1888

Fax: (619) 686-1887

E-mail: sales@biospherical.com

URL: www.biospherical.com

Copyright © Biospherical Instruments Inc.,
2002

*Specifications subject to change without notice